

"Severo Ornstein"
BBN Interviews
Tape #3
-- CARIBINER GROUP

(OFF MIKE)

QUESTION

Uh, why don't we start off with tell ... tell us who you are, and what your original function was in ARP, uh, ... you know, with the ARPANET back in '69.

SEVERO ORNSTEIN

Well, I'm not sure what my original function was. Uh, my name is Severo Ornstein. And, uh, I got associated with the, uh, ARPANET thing, having been at BBN for about a year, I, uh, had cast around for something that was suitable for me to do, and I worked for a while in a ... in a, uh, PDP 10 group, uh, working on a time sharing system. But I basically didn't believe in that. So, uh, Frank was trying to figure out what to ... uh,

what ... what I might do. And he gave me a copy of the RFP from ARPA for the NET, and said "well, why don't you look at this, and see what you think of it?" But it wasn't clear at all what he thought of it, at that point. But I think it home, and I read it. And, uh, it looked to me as though it was something that could be ... it could be built, all right. But, uh, I couldn't understand why one would want such a thing. "And I said the same to Frank the next day. And, of course, uh, that gives some clue as to my ability to predict how things will go.]

QUESTION

Okay. Um, well, here's sort of your ... well, let me back up a little bit. What was ... what I'm looking for is, what was it like back then? I mean, the team ... this fraternal order of people that worked on this thing. Can you give me a sense of what it was like working back then, the intensity of it all, and so on?

SEVERO ORNSTEIN

Working. You mean, as we were writing the proposal, or as we were ...

SEVERO ORNSTEIN

From the time of writing the proposal, all the way through ...

SEVERO ORNSTEIN

Well, writing the proposal, uh, took place over a period of time, within a number of people. And we gradually pulled the crew together that was eventually to work on the thing. Will

Crowther(?), for example, was not at BBN at the time that the proposal was originally ... that we began writing the proposal. But, uh, we got him involved. It was ... uh, it was a very busy time.

I worked ... I remember sitting up until all hours of the night with Bob Kahn in the back room of my home in Newton, at the time, uh, working on, uh, how routing would work, and so forth. We ... we were all pretty busy, I would say.

#3
9-month + 10

And, in fact, we spent so much time, and effort, and money on creating the proposal, that the management of BBN, at that time, was a little bit concerned. In fact, they were substantially concerned, because I think they felt we, uh, didn't have very much chance of winning the bid, uh, because we were up against so many large computers. And so there was ... uh, there was a good deal of concern about the money that was being spent on writing the protocol.

And, um, I don't remember exactly, uh, who all the people were who became involved in it. But, uh, the principals spent a lot of time working out the details. Bob Kahn, for example, at the time, had no ... no experience whatsoever in hardware design. And he followed me through the design of the interfaces, uh, and in gory detail wanted to come to understand how hardware design was done. And also, wanted to understand how the interfaces were going to work. He really wanted

to understand that. And, uh, I think one of the reasons that ... one of the things that contributed to our winning of the bid ... well, there are a couple of things that I'd ... I'd think are important. First of all, the detail that we went into ... I mean, I had complete design for all of the hardware that was going to go into the thing. I think we had a much more detailed proposal than anyone else. And it may not have been more voluminous, but it was more, in fact, detailed. And secondly, we took the problem on as a problem, rather than simply trying to respond to all of the things in the RFP, because the RFP, in fact, had some contradictions in it, as I recall. And we viewed the whole problem as what we were working on. And we made proposals which, in many instances, went against things that were, uh, proposed in the RFP. Uh, we simply said "no, that's a bad idea. You don't want to do it that way. You want to

do it this way. And I think that was ... it was clear that we were really working on the problem, all the time. And I think Larry Roberts understood that. And I think that's one of the reasons that ... that we won the bid, eventually.

QUESTION

Uh, I've heard stories of, uh, dogs and juggling. Do you ...

SEVERO ORNSTEIN

Dogs and juggling?

QUESTION

Do you remember?

SEVERO ORNSTEIN

Well, yeah. My memory is that, uh, the juggling actually came later. Dogs? I don't remember anything about dogs.

QUESTION

I just heard that people brought their dogs into work, and were spending time juggling, and ...

SEVERO ORNSTEIN

I think the, uh ... I think the juggling, actually, in my memory, came later. We were, uh ... we were too busy to do ... to do much juggling at that stage of the game. Later on, there was ... there was a certain amount of that just because we were so frenetic. But, uh ... and I don't remember anything about dogs. But I'm sure my memory is incomplete. There probably were dogs.

QUESTION

Nice dogs.

SEVERO ORNSTEIN

I may have had one.

QUESTION

Um, rumor has it that you're sort of tough on Honeywell. I'd like you to sort of take a breath, and try and incorporate, you know, the question into the answer, and ... and tell me a little bit about the ... the experience with Honeywell.

SEVERO ORNSTEIN

Well, the ... the experience with Honeywell was ... uh, was varied, uh, and pretty intense. We chose the Honeywell machine, originally, because it looked to us to be the best bet. The ... I think they had sold about five hundred of the 516's by the time we came along. So it looked as though it was a mature machine. Or, at least ... you know, at that time, five hundred of computers was a large number. And so, we thought that those machines were probably pretty solid. And, indeed, it turned out that they were. Although, we discovered, in the course of the design, a, uh, fundamental flaw in the, uh, IO system that we had ... that they had to fix, in order to make the machine work. That was simply because we were pressing the IO system harder than any other user had pressed it. Um, yes, we had a lot of trouble with the, uh ... with Honeywell, because, uh, they really didn't somehow understand the design that I was

proposing. And they kept making an approximation to it, and sending it ... uh, sending us, uh, their version of the design back. What had happened was that I did a complete logic design. But it was not implemented in the packages that Honeywell had to work with, their own packages. And they were really making the transformation from my design to the ... their fully packaged design. But, in the process, they lost a lot of the important features of the thing. And it was the devil's own time getting it to ... to get ... get it right, as it were. And, in fact, [there was one time, I remember Frank standing at the, uh, window shaking his head, as I was out on the loading dock, and turning a truck around that had brought a machine from Honeywell, because they had shipped at a ... at a time when we had not tested it. And I had told them that we could no longer accept a machine that was ... that we hadn't checked out, because

#3
Saw him
on Honeywell

they were simply sending us things that were unworkable, and that had to be worked over so much, that we might as well have done the whole thing ourselves. Eventually, they got it straightened out. But it took the longest time. And it was ... it was a real struggle. And, yes, there was a lot of bitterness. And I think I was viewed with some fear, at ... at Honeywell, before the ... that ended. But that wasn't unusual.

QUESTION

Okay. Um, we're ... we're trying to build sort of a texture of the people. So we're looking for idiosyncracies, and quirks. And, uh, little funny anecdotes about, you know, some of the guys on the team. Can you talk to that at all?

SEVERO ORNSTEIN

Well, let's see ... yes, I can tell you a little bit about it. Will Crowther, with whom I've not only worked, but climbed many years, was, at that

time, at Lincoln Laboratories still. A number of us had previously been at Lincoln Laboratory. Frank and I, among others. But, uh ... Will was still there, when this project began. And we ... Frank and I both felt that having Will come over for ... and work on the thing was really important if we were going to do this thing, because he was the star programmer. And we called Will, and I think he got involved in the ... in the project while we were still making the proposal. And Frank wanted Will to come with us down to Washington to make a presentation, or to ... I don't remember the details, exactly what it was. But it was something like that. And Will was renowned for never wearing shoes. Will always wore sneakers everywhere we ... he went. In fact, he had one pair of shoes that he wore, I think, only on his wedding day, and never again. He had them in his desk. But the rest of the time, it was sneakers. But Frank was concerned

about how this would appear at, uh ... in Washington, when we went down to make the presentation. And, uh, so he had me get on the phone to Will. Everyone else was standing around. And, uh, and tell Will that it was really important to wear shoes. So I did that, as Frank requested, knowing full well what was going to happen. And Will said, "you tell Frank that they've seen my sneakers in J. Sack(?) meetings, and it will be all right. And, indeed, it was. I also threatened to ... I was a member of Resist(?), at that time. And, of course, this didn't set well. It was, as you say, during the, uh, Vietnam War. And I was very much an anti-war activist. And I threatened to, uh, take my Resist button, and put it on the general's coat down in Washington, at the meeting. And I think, for a while, that Frank thought that I might actually do that. I didn't, of course.

QUESTION

Um, oh, let's see what else ...

(OFF MIKE)

QUESTION

Severo, you know, I told, um, Ben Barker about that sneaker story. Or he started to tell that sneaker story?

SEVERO ORNSTEIN

Oh yeah?

QUESTION

And he said, "no, that was when we went down to meet the phone company." And I said, "no, now, two or three different people have said that it was when ... it was a Washington trip."

SEVERO ORNSTEIN

I think it was.

QUESTION

Yeah, I think ...

SEVERO ORNSTEIN

I don't think ... uh, yeah, well, uh, I ... there's another ... I can tell you another story about Ben,

as a matter of fact. Ben had been a student of mine. I was teaching a design course at Harvard, at the time. And Ben had been the only undergraduate in a graduate seminar that I was teaching. And he was clearly very bright. And we ... he was being ... he was another person that was being brought into the ... into the company, at that time. And we had a meeting in New York that ... with the telephone company, because they didn't quite understand what we were doing, and didn't understand our needs, and we didn't understand their equipment. It was, uh ... it need ... we needed to get together. And it turned into a fairly high level meeting. In fact, it, uh ... it was the fanciest set up that I've ever seen, with cigars, and candy, and all sorts of stuff laid out around a big giant round table. And Ben was ... uh, we took Ben with us down to the meeting, because we wanted him to understand what was going on in great detail.

And, uh, I thought that, uh, Ben would be pretty impressed, because here he was, a Harvard undergraduate, being dragged into a fairly formal meeting. And he took it quite coolly. And I understood later why. Because as we were taking the train back to Boston ... because, uh, it snowed that day, and all flights were canceled. Ben sort of out ... just out of New York, snapped his fingers and said, "gee, I should have called Dad, we could have just used his helicopter." And I discovered that his Dad, I think, managed the money for Dup ... for Dupont. And, uh, Ben was not likely to be impressed by any meetings that we were going to go to. He took it all in stride.

QUESTION

How do you feel ... sort of reflecting back twenty-five years ago, how do you feel about being involved in this project?

SEVERO ORNSTEIN

Well, of course, obviously, it's turned out to be ... the project, twenty-five years later, has turned out to have, uh, implications far vaster than I think any of us understood at the time. It's easy for people to look back and think they understood what was going to happen, twenty-five years later. My own impression is that very few people really understood what was likely to happen, or how large this was going to grow. I clearly didn't. But, at the time, I think no one understood the level of the kinds of communication that have taken place.

Certainly, it's true that people talked about programs being exchanged. ARPA, after all, had a number of centers around the country, that some of the work that was ... was being duplicated, they had tried to integrate these things by, for example, uh, mostly putting PDP 10's into place, so that software could be exchanged. But it was difficult to do. And, in general, it wasn't done.

There was some commonality, because of the common machine. But not ... not as much as they wanted. And that was understandable. But it was really thought of, I think, originally, as an economy measure, and as a means of getting the researchers to communicate with one another. But not through ... not through written messages. I don't think that was the original thought. The idea, I think, was originally ... and that was what I remember from the RFP, that it was ... that it was mostly a discussion of exchanging programs and data, and that there would be the kind of messages and bulletin boards that have, uh, sprung up since then. I don't think that it was really in anyone's mind that ... at least there ... it wasn't the thing that was primarily talked about. Looking back, of course, it ... it amazes me what's ... what's happened. It's obvious, in retrospect. But it certainly didn't ... I don't think ... it wasn't

obvious to me at the time that anything like this would happen. And when we talked about exchanging programs, and exchanging data, it ... it seemed as though that was less likely to blossom if anyone had ... had talked about the kind of message systems that we know have, where ... which is one of the main visible uses of the network, why I think perhaps that would have been more comprehensible. But I don't really understood how much usage has been made that was as originally conceived, and originally discussed. But, uh, it's ... one can't help but be, uh, amazed at how this thing has blossomed, and become a part of the whole country. It's on the radio in Canada, it's ... as we were traveling just now, you hear people giving their ... their Internet addresses, and telling people how to call up and get on a bulletin board of some sort or another. Not only in the States, but in Canada now, as well.

QUESTION

Do you have ... I mean, are you happy about being involved with ...

SEVERO ORNSTEIN

Oh, sure.

QUESTION

With the project?

SEVERO ORNSTEIN

Oh, sure.

QUESTION

I'd like to hear some of that kind of stuff.

SEVERO ORNSTEIN

Well, uh, yes, I have reservations about the impact of technology on society, in general.

And, uh, so this is part of that. But this seems to me to have had a beneficial effect. And I have a strong interest, as you know, in, uh, sort of the social consequences of technology. And this particular one seems to have largely benign effects, at least, so far. I'm not sure what's

going to happen in the future, now that it's becoming a big deal, an even bigger deal. But, uh ... but certainly, I feel very happy and proud to have been a part of this, as well as a couple of other things that I've managed to do over the course of my career. But, uh, it's not clear to me what's going to happen in the future. I'm a little concerned, at this point, that, uh, commercial exploitation is liable to change the nature of the beast quite a bit. We'll just have to wait and see what happens.

QUESTION

Do you remember any jokes, anecdotes? Best, worst experience? Anything?

SEVERO ORNSTEIN

Uh, let's see. Best, worst experiences? Good heavens. Well, uh, I'd have to think about that. I don't ... nothing particular comes to mind. We almost all had our heads down. Uh, of course there were ... there were funny times that ...

that took place, funny things that took place.

But I ... nothing specific comes to mind. There was a lot of humor in the work. We worked late hours. Uh, the usual kinds of things that go on in computer science. At least, during ... during that period. No, nothing specific comes to mind.

Let's see. I guess there's one thing that I do want to mention. I think that our paranoia about failure, which was manifested later in the Pluribus design ... [I think that our concern about solidity, and about having things rigorous was ... was part of why things succeeded as well as they did, in the early days. For instance, Frank was insistent ... in fact, we tried to get people to ride on the airplane ... on the aircraft that was delivering the Imps to the first sites. I don't think we ever actually succeeded on getting a person in the aircraft. I'm not sure about that.

But I do remember sitting in airports late at night. Partly myself, partly true at Thatch, picking up

the, uh, the computer at its destination, and even meeting it at intermediate destinations, when it was going to be transferred, to make absolutely sure that nothing went wrong. That they didn't drop it, that it didn't get put on the wrong airplane. That it was ... that it was safely accompanied all the way there. That was sort of symptomatic of the kind of care and attention that we put into the thing. And we were equally concerned about the school. And so, we worked like demons to get the thing ... to get the thing solid, and to get it there on time. And I think that ... that helped with the general thing. It not only made BBN look good, but it helped, I think, with the general thrust of the whole project, because there were other sites involved, and they were also held ... held to schedule. And, uh, partly because BBN was doing its thing on time. And I think that just raised the general spirit of the, uh, activity across the board, the

#3
end

rigor with which we approached the whole thing.

QUESTION

I understand you formed an organization called the Computer Professionals for Social Responsibility. Can you tell me a little bit about that, and what its purpose is?

SEVERO ORNSTEIN

Well, yeah. The original purpose, the original concern ...

(OFF MIKE)

SEVERO ORNSTEIN

Well, in ... in the early 1980's, it began to look to me as though, uh, there was a really serious threat of actual nuclear confrontation between the United States and the Soviet Union. And it seemed that irrational things were happening. And I was beginning to get really worried. I had always felt that, sooner or later, some sort of, uh, confrontation might take place, or some sort of nuclear accident. I still believe that. And, at

that time, it looked as though things were getting out of hand, and as though it was going to be more immediate than I previously had thought. And so, I sent a message out on the ... on the, uh, Net. It was just local, at Xerox Park, at first, saying that I was concerned about this, and that I was forming a ... forming a discussion group. And from that original message, other people, of course, fairly quickly became involved. There was a lot of discussion. Messages flew back and forth. And eventually, a group of us formed a ... formed ourselves into a discussion group who ... who met. And finally, we decided that there was really material for an organization. There was a thing called Physicians for Social Responsibility, at the time. And we modeled an organization after that, and, uh, named ourselves accordingly. There was everything from shoe makers for social responsibility. But for society responsibility meant concerned about atomic

war, basically. And, uh, that was the original ... uh, the original motivation for, uh, forming what has become CPSR. But since that time, of course, the obvious threats of ... of, uh, possible confrontation have disappeared, or have certainly lessened. And there ... by the time that ... uh, by this time, many, many other issues involving computer technology and society have become important. Privacy issues, and ... and so on. And so, the organization has gradually broadened its agenda, and has widened its scope to include these other issues, as well. In fact, those have become ... these other issues have become predominant issues. At the moment, CPSR is concerned about the ... uh, what's going to happen to the Internet, as time passes, as the government becomes more broadly involved with it, and as this so-called superhighway gets underway. They're concerned about the privacy issues, and about the access for ... uniform

access for people, so that it not become a ... just a plaything just for the well to do, and that it not be just a commercial venture.

QUESTION

I understand. It's sort of surprising to me that, uh, someone who ... who was so intensely working on this, and important in the development of ... of ARPANET in the first place, is not on Internet today in your own home.

Why?

SEVERO ORNSTEIN

Well, uh, I guess I had a history of, uh, plunging deeply into things, getting them going, and then backing off, and doing something else. My own life, now, is, uh, consumed in totally different directions. I've had very little to do ... I've been retired for over ten years now. And I've had relatively little to do, really, with computer science. I'm not at all cognizant of the current ... current state of things, since I've retired. I've

just simply been doing other things. You have only one life. And, uh, for me, anyway, diversity is of the essence. And, uh, I did computer science very hard for thirty years. And I have wanted to do things in ... in other arenas, mostly in the music field, since then. And the amount of attention that being on the Net used to require - partly because of CPSR - was just overwhelming. And I simply needed to ... to cut my life down, so that I could spend time doing other things. And so I ... my wife and I both deliberately cut ourselves off from that set of communications. We do have a fax machine. But, uh, we don't, uh ... we try very hard to keep that kind of communication to a minimum. We do write a lot of letters, actually. Uh, and that's a ... but we're interested in writing. But, uh, the kinds of communication that we had before seemed really not to fit into our life, as it exists now. And mostly that's true.

Occasionally it's an inconvenience and I do wish we had a, uh, connection. But, uh, the down side for me personally is larger than the, uh ... than the up side.

QUESTION

Um, if ... if you could sort of blue sky (Overlap) for a minute and talk about what you think ... where you think, uh ... the networking of computers might be twenty-five years from now. As opposed to twenty-five years ago.

SEVERO ORNSTEIN

Well, I don't know that I have any opinion about where it will be twenty-five years from now.

Clearly my opinion about where it was going to be now twenty-five years ago was worthless, so, uh, I don't think that I should, uh, be the one to, uh ... to guess about that. I think it's ... it's already matured a great deal. And we've seen the direction shift from what the original, uh, conceptions were. And it will no doubt shift

more. I worry ... uh, I ... it's more a concern than, uh ... than a prediction. I'm terribly concerned that commercial interests ... because of the success of the thing ... that commercial interests will bend the, uh ... bend the use of it. I think it's ... uh ... all of the characteristics which those of us who, uh, have participated in it have come to know and love the, uh ... sort of generally ... uh ... I don't quite know to ... uh, what the word I'm looking for is. Uh, the anar ... uh, anarchy that exists in the network generally as to, uh, communication how to ... how to handle communication, it's worked very successfully in the community that's used it up to know. I don't know how that's going to work in, uh ... in the future. Uh, but I hope that the rules don't change too much. Because I think that kind of, uh, anarchy is ... is very, very helpful. I think it's an important, uh ... an important social instrument. And, uh ... and it's

Re:
anarchy

likely to, uh, become ... uh, viewed in ...
increasingly as a political instrument as well.
And that again may influence what ... uh ...
what's done with it.

QUESTION

Let me try and put a new spin on the same
question. What would you like ... where would
you like to see ... (Inaudible) how would you like
to see it develop?

SEVERO ORNSTEIN

Well, you know, that ... what would I like to see
it develop? Uh ... I'm not sure. I guess the best
of all possible ... in the best of all possible
worlds it's a vehicle for communication that gets
people interested in things that, uh ... in social
issues and in issues that, uh, are important to
this(?) society ... that they otherwise would not
be, uh ... so directly connected to. I think, for
example, uh, going back to the, uh ... the
message that I sent out initially ... I think there

*Vehicle for
communication*

Ornstein's
"initial message"
what said?

were a lot of latent feelings and(?) concerns that were set ... uh, set off and touched by the original message that I sent. And there people I think that, uh ... it ... it enabled the existence of CPSR, as far as I'm concerned. The, uh ... initial, uh, message simply triggered in a lot of other people feelings that were there ... and interests and concerns that were there. And it made it, uh ... made it possible for them to, uh ... start to express those and to participate in ... uh, some activity that, uh, related to those. And I would hope that the same kind of thing can, uh ... can happen in future. I think that there is a lot of political discontent in the country. Which is, uh ... is not very easily, uh, touched, uh, because of the tremendous frustration. And one of the things that, uh ... that the network can do, of course, is to permit, uh, the kind of communication than enables people to feel that they're not quite so impotent and quite so

as political
instrument.

powerless as they otherwise would feel. So that kind of usage, as far as I'm concerned, is ... uh, is one of the best uses of the thing. I view it as a potential political, uh, instrument, as I say, for, uh ... what, uh ... one of friends called

7. *militia.* "catalyzing malaise." That is, uh, pulling together, uh, some of the, uh ... some of the discontents and ... and getting people to the point where they think they can do something about it rather than being just, uh ... feeling ... throwing up their hands. So that's the kind of usage I would like to see most.

QUESTION

Um ... I understand back in the old days ... uh, in(?) the late sixties you used to use BBN's computers to do some thing other than research and work. Like play games. Invent games. Uh ...

SEVERO ORNSTEIN

Yes, uh ... that I'm ... uh, that was indeed done.

I was not one of those. I'm not a games person. I'm unusual, I suppose, in that regard as a computer scientist. Most computer people are more interested in games than I am. I'm not. And so I never did that. But I know that other people were doing that. And, uh ... in fact, uh ... well, Will Crowther ... I lived with Will for a ...for a period of time ... uh, prior to our, uh, connection with the ARPANET. And, uh ... at that time Will was working on the design of what eventually became, uh, the adventure game. And, uh, that turned into, I guess, Dragons and Dungeons. And all sort of ... and there have been all sorts of offshoots since then. And Will is a games person par excellence. And, uh ... and so, he was, uh, much more involved in that. I ... uh, never really participated in the game playing at all. I was interested in other topics, but not games in particular. And, no, I didn't use the computers, uh, terribly much for other things.

I was not a user so much as a designer in those days. Remember I was a hardware designer, not a, uh ... not a programmer. I had been a programmer in the past. But programming ... the programming art changed, uh, very rapidly during those years. And ... and, uh ... fundamentally I became just a hack as far as programming was concerned. And became a logic designer really.

(OFF MIKE)

(END OF TAPE THREE)

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QUESTION

Uh ...

(OFF MIKE)

(END OF TAPE THREE)